City of Richmond

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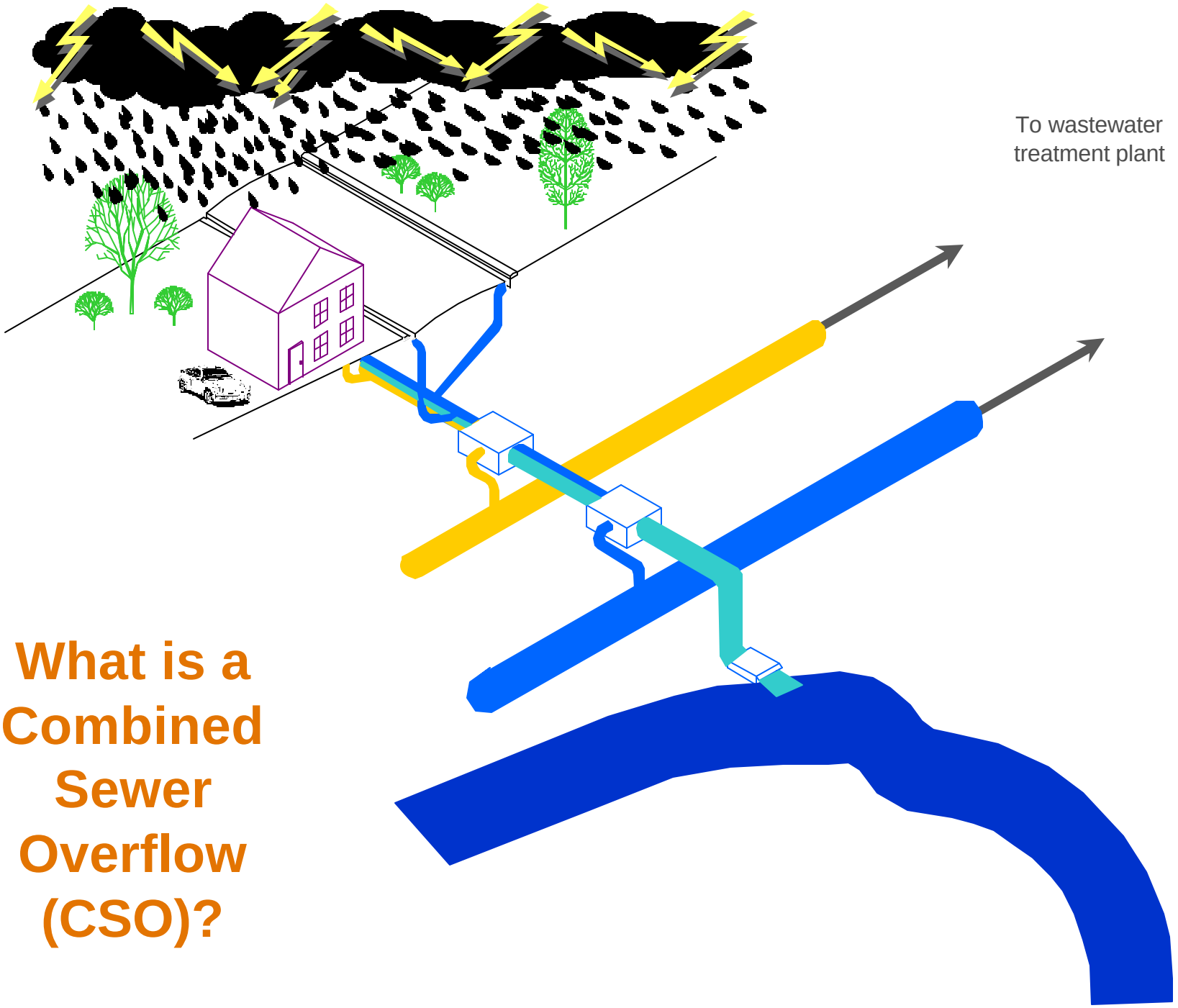
City of Richmond CSO Control Program

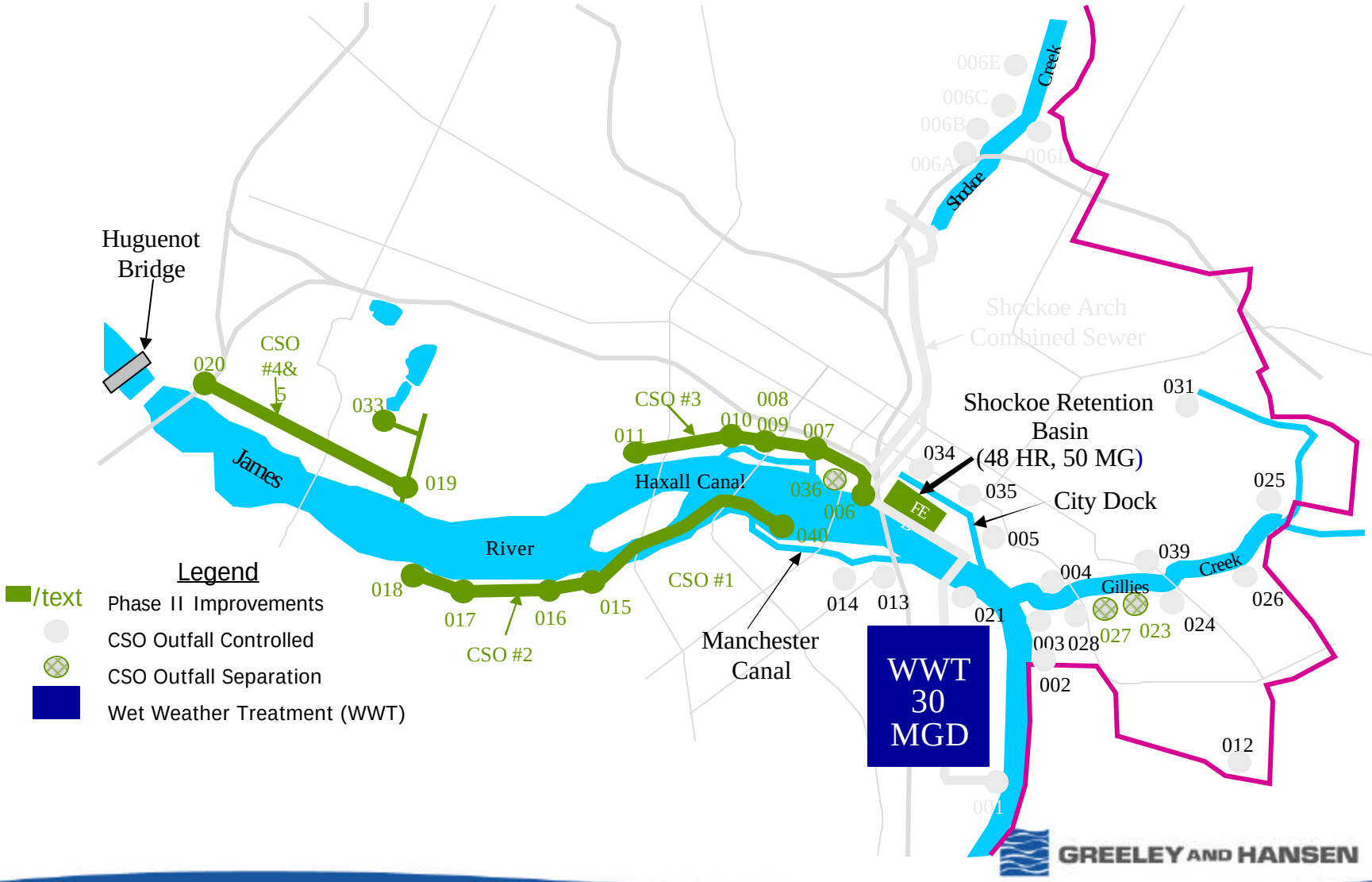
Richmond CSO Long-Term Control Plan

Tuesday, March 10, 2009

What is a Combined Sewer Overflow (CSO)?



Richmond's CSO Control Plan
After Phase II Improvements



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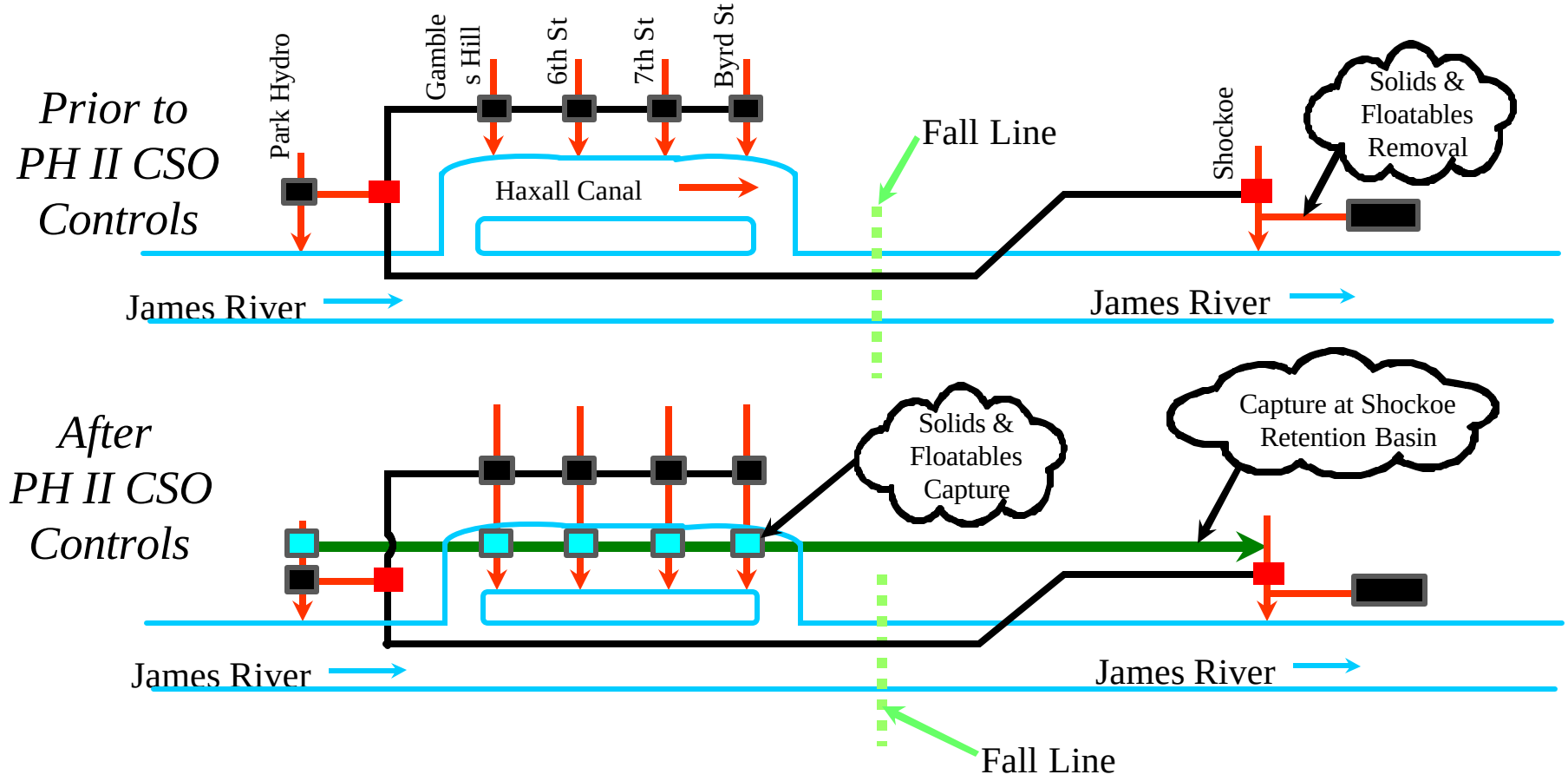
North Side James River CSO Controls



Performance

- Removes CSOs from sensitive areas
- Reduces CSO loads downriver
- Increases CSO treatment

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Gambles Hill CSO Outfall

Before and After CSO Control (1996)

Before (1996)

After (1998)

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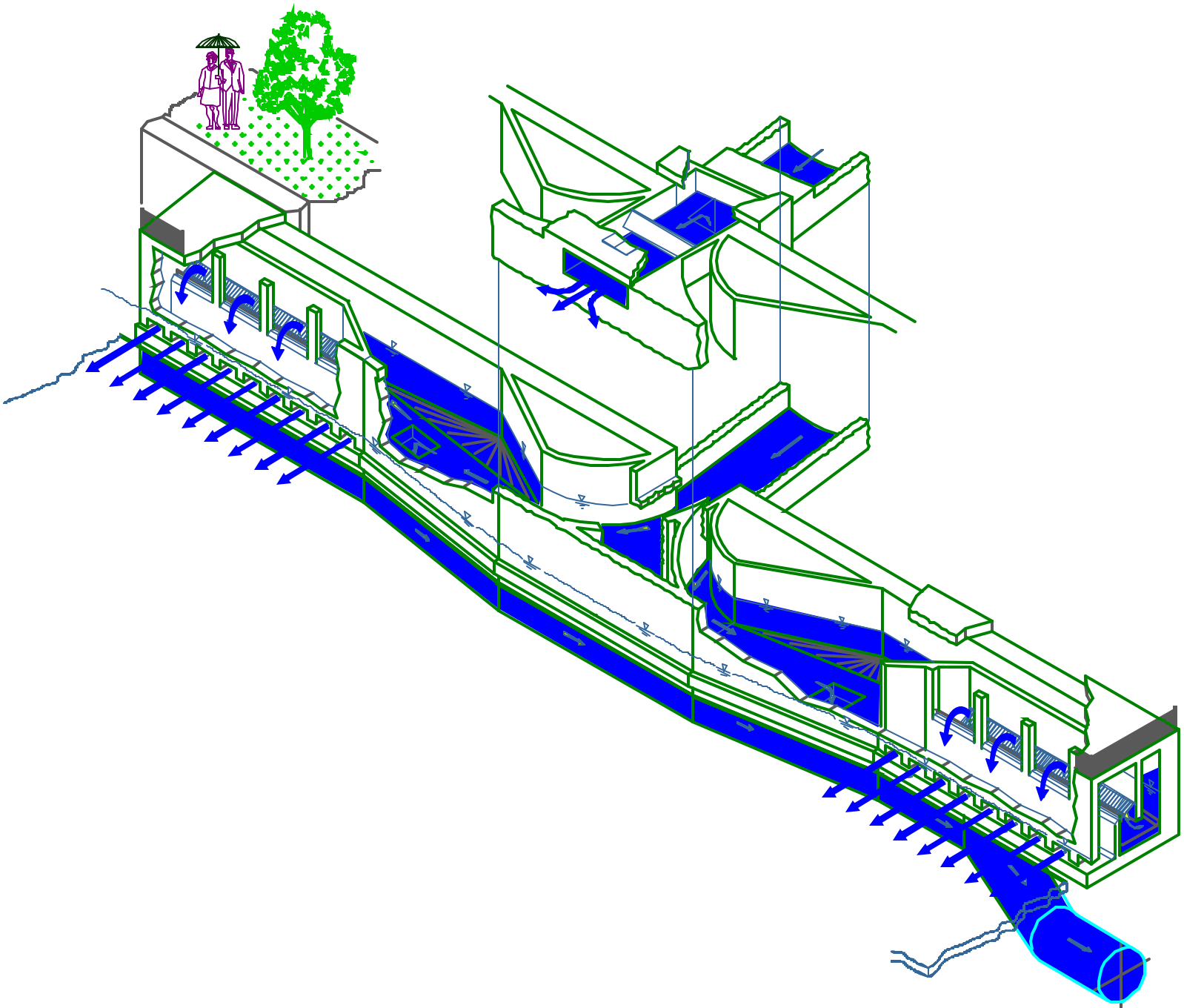
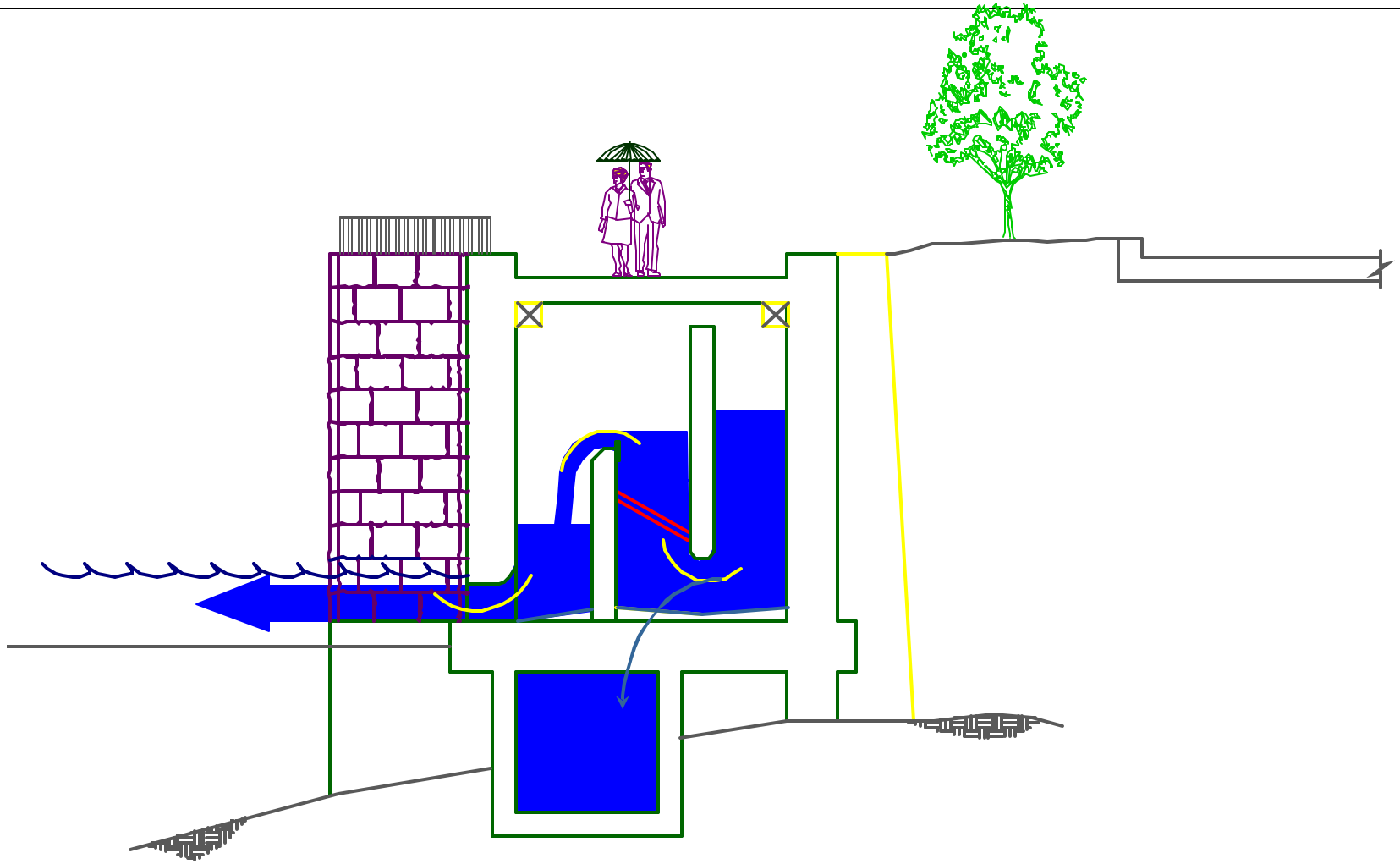
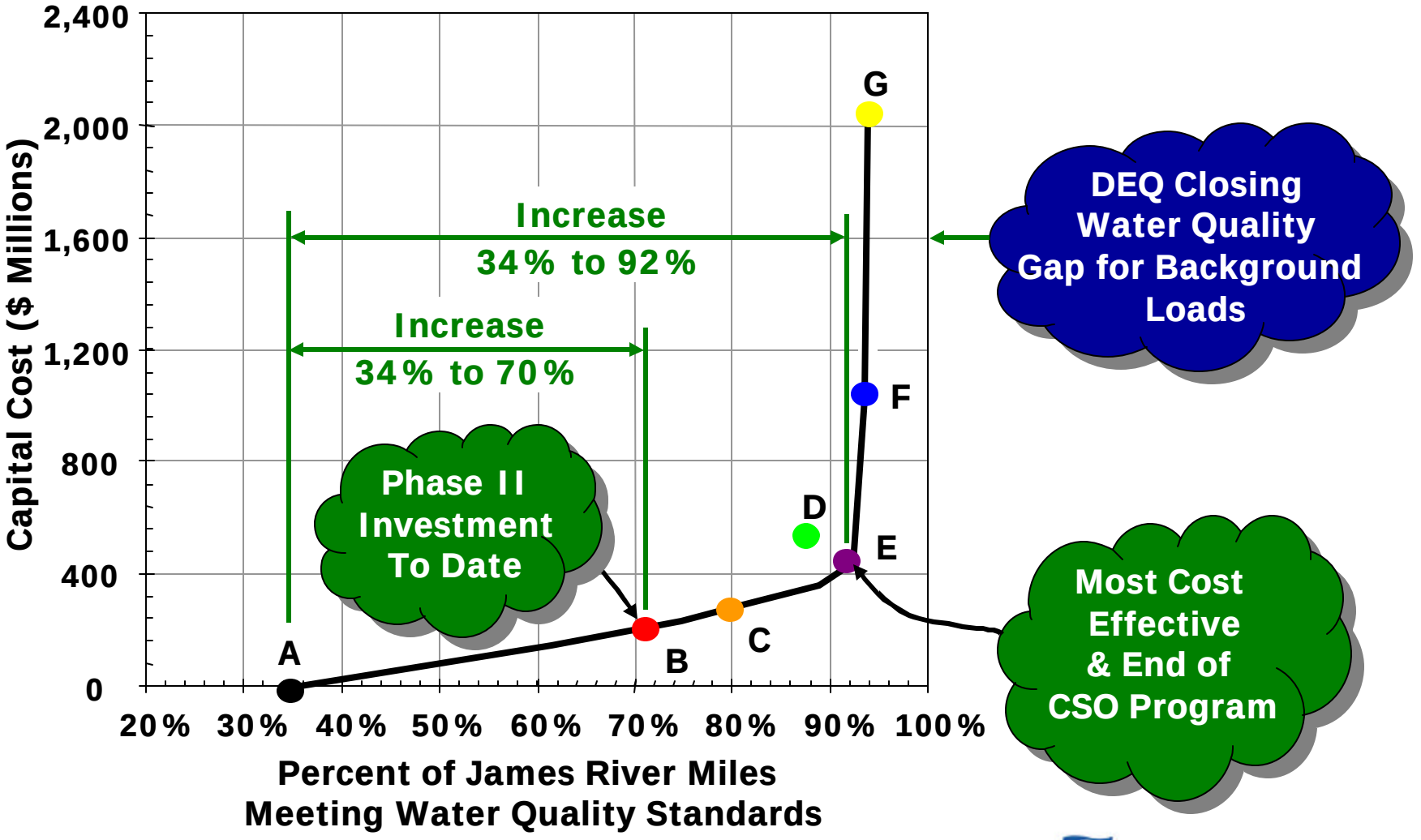


GAMBLES HILL WET WEATHER FLOW REGULATOR



LTCP Re-Evaluation Results

Percent of James River Miles Meeting Fecal Coliform WQS



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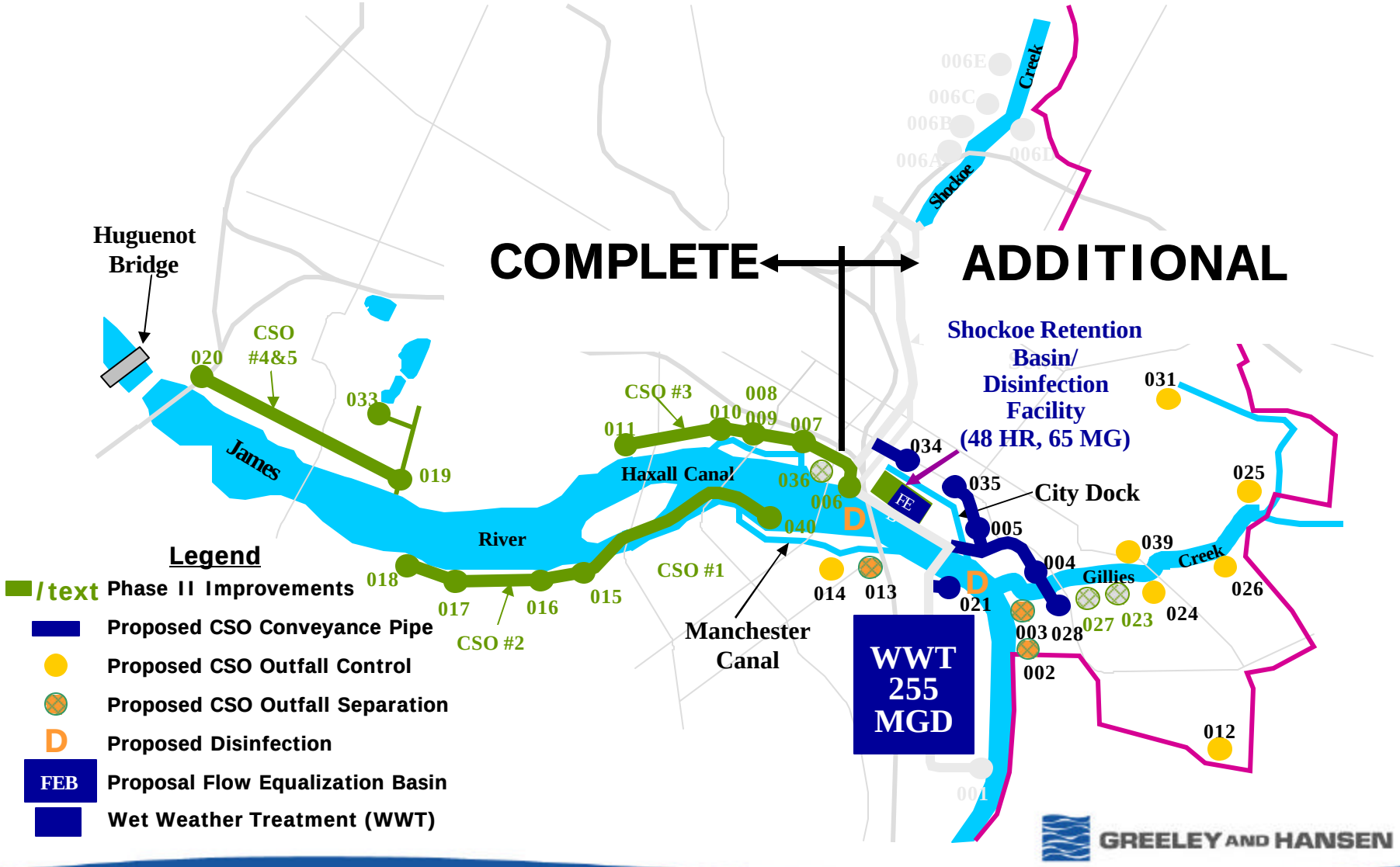
Section 3: Existing System Description
CSO Long-Term Control Plan: Alternative E



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CSO Program Performance

CSO Control Programs	Project Description	Percent of Volume Captured	TSS Removed (tons/yr)	BOD Removed (tons/yr)	% of Miles Meeting WQS
No CSO Control		55.6%	3,310	1,590	34%
Phase I (Complete 1990)	Control of City's largest Shockoe CSO watershed through Retention Facilities and increase wet weather flow treatment at wastewater plant	75.7%	4,900	2,300	67%
Phase II (Complete 2003)	Control CSO discharges to less than 4 overflow per year in sensitive areas	76.6%	4,960	2,320	71%
Phase III (2003 to completion)	Additional CSO controls with "Knee-of-curve" cost effectiveness	87.7%	5,490	2,520	92%

CSO Phase III Program Project Plan
Estimated Capital Cost & Schedule

Special Order Req't	Project Description	Preliminary Estimate of Construction Schedule		Preliminary Estimated Range of Capital Cost in 2006 dollars (in thousands)	
		Start	End		
1	Disinfection Pilot Study		Jun-05	$700	$700
2	Phase III - Program Project Plan		Dec-06	$4,300	$4,300
3	Solids and Floatable Control for CSO Outfall No. 024	Jul-07	Feb-09	$1,600	$2,000
4	Solids and Floatable Control for CSO Outfall No. 026	Jul-07	Feb-09	$1,600	$1,900
5	Solids and Floatable Control for CSO Outfall No. 025	Jul-07	Feb-09	$1,500	$1,800
6	Fulton Bottom Urban Renewal Separation Project	Jul-09	Feb-11	$1,100	$1,300
7	Maury Street Separation Project	Jul-10	Feb-12	$800	$1,000
8	Orleans & Nicholson Street Separation Project	Jul-11	Feb-13	$1,000	$1,200
9	Peripheral In-Line Flow Equalization at Oakwood	Jul-12	Feb-14	$6,500	$7,800
10	Solids and Floatable Control for CSO Outfall No. 012	Jul-13	Feb-15	$4,000	$4,800
11	Solids and Floatable Control for CSO Outfall No. 014	Jul-14	Feb-16	$1,700	$2,100
12	Solids and Floatable Control for CSO Outfall No. 039	Jul-15	Feb-17	$1,600	$1,900
13	Lower Gillies Creek Conveyance	*	*	$30,100	$36,100
14	WWF at the WWTP: WWF Treatment up to 140 mgd	*	*	$10,500	$12,600
15	WWF at the WWTP: Wet Weather Disinfection Facilities Project	*	*	$100,600	$120,700
16	WWF at the WWTP: Expand Secondary WWF Treatment Project	*	*	$37,600	$45,100
17	SRB: Adapt Existing Basin for Pass Through WWF Project	*	*	$30,100	$36,200
18	SRB: Shockoe Retention Basin 15 MG Expansion Project	*	*	$85,500	$102,600
19	SRB: Shockoe Wet Weather Disinfection Facility Project	*	*	$31,600	$38,000
	PHASE III CSO CONTROL PLAN TOTAL			$352,400	$422,100

Note: (1) Based on December 2006 ENR Construction Cost Index of 7,888

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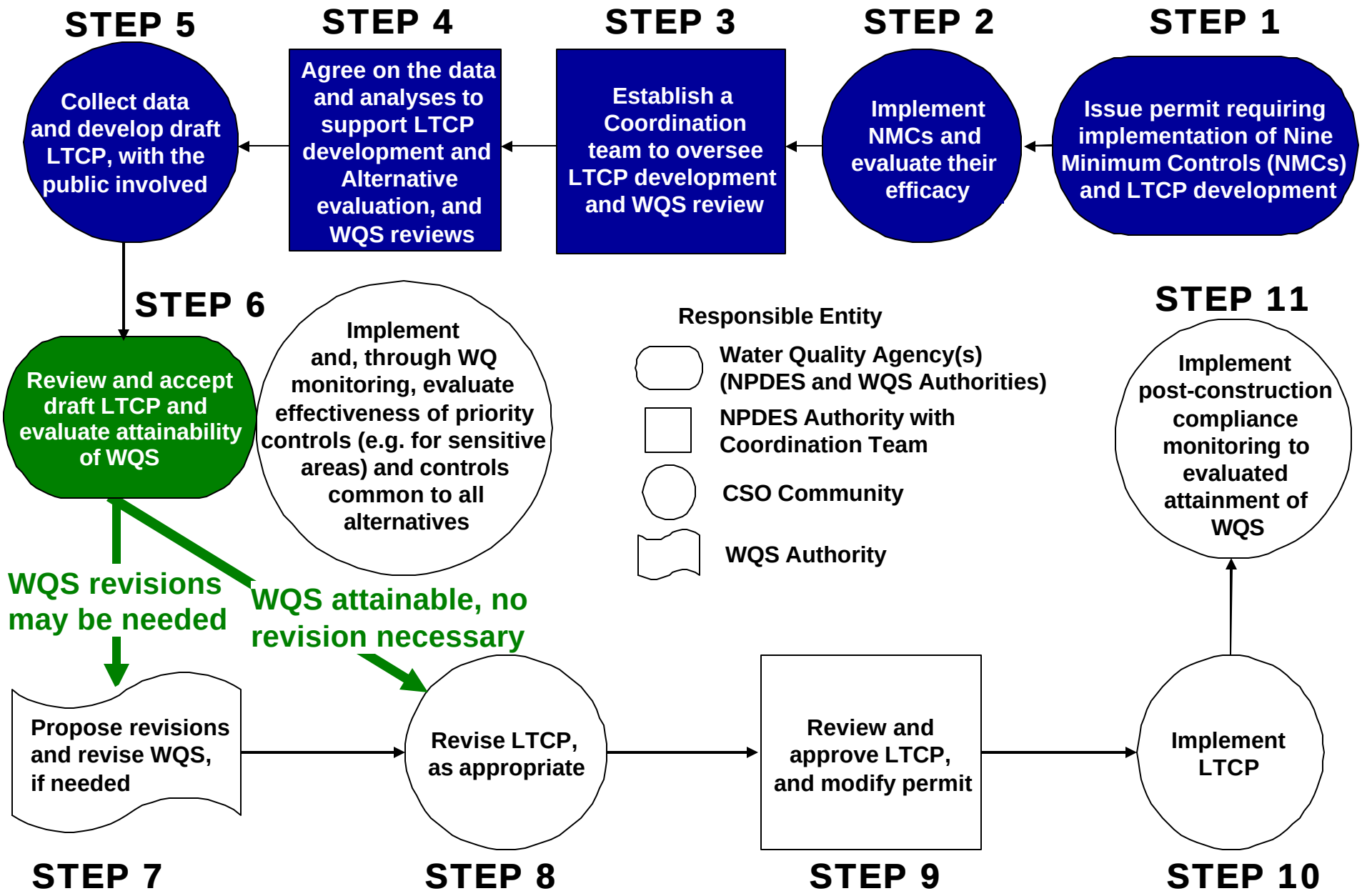
CSO Phase III Program Project Plan
Potential "Functioning Elements"

Facility	Capital Cost (1)	Additional Annual O&M Costs	Annualized Costs (2)
SO Requirement No. 13			
CSO 028A Separation	$977,000	$2,000	$73,000
CSO 028E Separation	$1,955,000	$4,000	$147,000
Solids & Floatable Control Regulator for CSO 004	$2,500,000	--	$182,000
CSO 034 Outfall Extension Pipe	$3,474,000	$7,000	$260,000
CSO 035 Outfall Extension Pipe	$2,513,000	$5,100	$188,100
SO Requirement No. 17			
Diversion Structure Improvements	$7,100,000	$106,500	$622,500
Crossover Chamber Separation Project	$10,000,000		$753,000
Access Ramp	$3,000,000	$30,000	$248,000
Retention Basin Improvements	$10,000,000	--	$753,000

Notes: (1) Estimated capital costs are based on an ENR Construction Cost Index of 7,888 for December 2006.
(2) Annualized cost is the sum of annualized capital cost (which is estimated based on debt service with bond term of 30 years and interest rate of 6%) plus annual O&M cost.

Water Quality Standards Coordination Process



City of Richmond, Virginia - DPU Stormwater

- **Stormwater Management Program**
  - **Water Quality**
  - **Drainage/Flooding**
    - **Upper Shockoe Stormwater Detention Basin Cleaning**
- **Erosion Sediment Control**
- **Chesapeake Bay Program**
- **Proposed Stormwater Utility 2009**
  - **Operations and Maintenance**
    - **BMP Maintenance**
  - **Capital Improvements**

City of Richmond, Virginia - DPU
Initial Thoughts

- **Review Modeling Inputs & Calibration**
  - **Stormwater inputs & watersheds delineations**
  - **Data for Calibration on tributaries to James River**
  - **How was Tuckahoe Creek modeled?**
- **Review Modeling Output to Confirm Waste Load Allocations**
  - **CSO**
  - **Stormwater**
- **Housekeeping Comments**
- **Gillies Creek is man-made paved channel – applicability?**
- **Implementation Plan? Schedule?**